



#### NEXT GENERATION ENTERPRISE MODELLING IN THE AGE OF INTERNET OF THINGS

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## Modeling Knowledge Work: Case Management and Decision-aware Business Processes

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### Well-known things from Switzerland

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NEMO 2017 - KnowBedge Work Designer

#### **The Ultimate Swiss Armee Knife**



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- Head of MSc in Business
   Information Systems
- Research Associate at University of Pretoria
- Adjunct Professor at University Camerino
- Topics:
  - Enterpise Modelling
  - Business Processes and Knowledge Work
  - Alignment of Business and IT

#### **Motivation**



Knowledge Work







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- Knowledge work is key to the success of many enterprises
  - differentiate physical goods
  - offer smart services
- One way to manage knowledge work is to treat it as a process.
- Business Process Management, however, is often regarded as incompatible with the autonomy and work approaches of knowledge workers.

#### **Work Patterns of Knowledge Workers**

Most of a knowledge worker's day is spent in unstructured work



Source: 2011 - 2013 Case Management Survey



#### **Types of Knowledge Work**





# **Modeling Business Processes**



#### **Classification of Processes**

structured process	case	ad hoc process		
<ul> <li>structured process flow</li> </ul>	<ul> <li>process flow can partly be structured</li> </ul>	<ul> <li>process flow cannot be structured – new tasks on the fly</li> </ul>		
<ul> <li>activites known in advance</li> </ul>	<ul> <li>activites partly known in advance</li> </ul>	<ul> <li>activites partly known in advance</li> </ul>		
<ul> <li>many repetitive elements</li> </ul>	<ul> <li>some repetitive elements</li> </ul>	few repetitive elements		
<ul> <li>no degree of freedom for people wrt process flow</li> </ul>	<ul> <li>some degree of freedom for people wrt process flow</li> </ul>	<ul> <li>very high degree of freedom for people wrt process flow</li> </ul>		
<pre> can be modelled</pre>				
partly translated from (Gadatsch 2005, S. 4				

#### **Structure of Processes**



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#### **Process Logic and Business Logic**



### **Types of Knoweldge Work**

#### *Objective: Integration*



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### **Agility of a Sports Team**







- A good player must
  - **sense** what is happening
  - **prioritize** best next action
  - act effectively
- A playbook defines moves
- But: moves depend on the opponent
- Playbook corresponds to
  - Business process model (process logic)
  - decision model (business logic)

but must allow for flexibility

based on an idea from (Cauley 2010)

#### **Analogy: Sports Team**



#### Agility in different levels:

- (Re-)Define moves/processes
  - procress/decision logic
  - design time
- Adapt moves/processes
  - process logic
  - ➤ run time
- flexibly react on opportunity or threat
  - ➤ decision logic
  - run time

adapted from (Cauley 2010)



# Example: Check Eligibility of MSc Candidates



#### **Exercise: Check Eligibility of MSc Candidates**

- First, the study assistant confirms that the application has arrived.
- The study assistant determines whether the bachelor degree is ok. The If the degree is unknown to the study assistant, she can look in the degree database or ask public authorities.
- It is checked whether the average grade is at least "good".
- The average grade is calculated, if it is not in the transcript.
- The study assistant has to register the student.
- The study assistant can discuss with the head of program at any time.
- The head of program decides, whether the candidate is eligible.

What is the base process?

- Which tasks are executed in every case?
- Which tasks are executed for specific cases?



#### **Exercise: Check Eligibility of MSc Candidates**

- First, the study assistant **confirms that the application** has arrived.
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- The head of program **decides**, whether the candidate is eligible.

The tasks in bold are the basic process:

- Tasks executed in every case
- Tasks executed for specific cases

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#### **Basic Process in BPMN**



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Which tasks depend on experience, preference or judgment of human worker?



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Tasks in bold depend on experience, preference or judgment of human worker



#### **Process as BPMN including Discretionary Items**





# **Modelling with CMMN**



#### **CMMN - Case Management Model and Notation**

- OMG defined a Modeling Standard for Case Modeling
  - Case Management Model and Notation (CMMN)
- Version 1.1 is from December 2016
  - http://www.omg.org/spec/CMMN/1.1/PDF/
- CMMN is specialized notation to model cases. It is independent from BPMN

#### **Design Time vs Run Time = Modeling vs Planning**

- A Case has two distinct phases: design-time and run-time
  - **Design-time: Business analysts** define
    - Tasks of pre-defined segments
    - "discretionary" Tasks that are additionally available to the Case worker
  - *Run-time: Case workers* execute the plan
    - performing Tasks based on control flow criteria,
    - adding discretionary Tasks if needed.



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#### **Basic Process in CMMN**



#### CMMN Case Plan Modelling in the Knowledge Work Designer

control elements: determine task execution



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#### **Discretionary Tasks: Freedom for Worker**



#### CMMN Case Plan Modelling in the Knowledge Work Designer

#### case plan model



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#### **Planning Table and Applicability Rules**

Relation of Planning Table, Discretionary Item and Applicability Rules in the Knowledge Model Designer



#### **Case Management Processes: Examples**

Case management processes: common in many industry segments, where activities and documents required depend on the circumstances of each case

- Benefits Administration
  - Examples: welfare assistance, student financial aid, grants programs, disability benefits
- Underwriting
  - Examples: commercial lending, life and disability insurance.
- Project Management
  - Examples: launch of a new product/service, major IT system upgrade
- Dispute Resolution
  - Example: customer demands a refund



(Silver 2011, p. 88f)



# **BPMN and CMMN**



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#### **CMMN for Subprocesses in BPMN**



#### **Comparing Elements of BPMN and CMMN**

	BPMN	CMMN	
Tasks	Tasks	Tasks	
Process hierarchy	Subprocesses, Call Activities	Process Tasks, Case Tasks	
Events	Events: start – intermediate – end catching – throwing	Event Listeners, implicit Events, Milestones	
Control Flow	Gateways/Events	Sentries	
	Sequence Flow Task 1 Task 2	Sentry with empty condition	
Planning		Discretionary Tasks	
Responsibilities	Lanes	Role attribute	
Process Container		Folder	

#### **Rules in BPMN and CMMN**

BPMN	CMMN	
Events/gateways	Sentries	
	Applicability rules (planning tables)	
Business rules (task)	Decision (task)	



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#### **Implicit Control Flow in CMMN**

#### What does it mean?



Visible conditions are better for understanding



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# **BPCMN: A combined Process and Case Modeling Language**

A combination of control flow elements of BPMN and discretionary tasks and planning elements of CMMN



a suitable language to deal with any kind of process.



#### **BPCMN – Combining BPMN and CMMN**



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# **Decision-aware Business Processes**



#### **Decision Tasks in Business Processes**

- A decision task is a task in which some decision is made
- Two kinds of decision tasks:
  - Decision tasks deriving values for data
  - Decision tasks providing data for gateways



# **Decision-Aware Process Models:** Managing Process Logic and Decision Logic Separately

#### **Process Logic**



#### **Business Logic / Decision Logic**

- The process model contains the process logic -> procedural
- Decision logic represented in a different kind of model
   declarative
- Separating business decisions from business process tasks
  - simplifies the business process model
  - allows to manage business
     logic in a declarative form



# **Example: Decision-aware Process**



#### Exercise: Decisions in Processes (1) Process Logic vs Business Logic



- How many decisions are made in this process?
- Which business logic can you identify?
- What would you improve?

#### Exercise: Decisions in Processes (2) Process Logic vs Business Logic



- A process model contains process logic
- This process only contains **one** decision wrt. process logic:
  - Execute «Reject candidate» or execute «Invite candidate»
- The criteria for the decision are written on the gateways. This is business logic and not process logic. It should not be part of process model.
  - Change in the criteria should not affect the process model.
  - The order of the criteria is not compulsory. There is an unnecessary sequentialisation.

#### **Exercise: Decisions in Processes (3)** Process Logic vs Business Logic

Process logic:



#### **Busness** logic:

data



Bachelor De	rgree	
FC	Bachelor Degree in	Bachelor Degree
	Information Systems, Business Administration, Information Technology, other, none	yes, no
1	Information Systems	yes
2	Business Administration	yes
3	Information Technology	yes
4	other	yes
5	none	no

- This model is more appropriate
  - Process is simplified
  - Decision logic is modeled separately
  - Change of business (decision) logic does not affect process model

#### Advantages of separating Business Logic from Business Process Model

- Allows a much simpler business process model
  - If a business process is too complicated, a reason might be that business rules are embedded in the flow
- Makes changes to business process and business logic easier
  - Permits changes in the Decision Model without changing the business process model and vice versa
- Makes governance of business processes and business logic easier to manage
- Decision Model can be reused in several processes
  - the whole decision model
  - individual decision tables and rules





# **Modelling Decision Logic**



#### **Decision Model and Notation**

#### **Decision Requirements Diagram Decision Tables** Candidate Eligible FC **Bachelor Degree** University accredited eligible Candidate **Eligibility Rules** €yes, no yes, no, unclear yes, no Eligible 1 yes yes yes 2 no no ٨ 3 no no unclear 4 yes yes **Bachelor Degree** Bachelor Degree Bachelor Degree in Bachelor Degree FC Information Systems, Business Administration, Information yes, no Technology, other, none 1 Information Systems yes Study Regulation Data Form 2 **Business Administration** yes 3 Information Technology yes 4 other yes 5 none no

#### **Decision Model and Notation**

#### **Decision Requirements Diagram Decision Tables** Candidate Eligible FC **Bachelor Degree** University accredited eligible Candidate Eligibility Rules yes, no yes, no, unclear yes, no Eligible 1 yes yes yes 2 no no Å 3 no no unclear 4 yes yes **Bachelor Degree** Bachelor Degree **Bachelor** Degree in Bachelor Degree FC Information Systems, Business Administration, Information yes, no Technology, other, none 1 Information Systems yes Study Regulation Data Form 2 **Business Administration** yes 3 Information Technology yes 4 other yes 5 none no Application form Transcript of Acceptance letter record **Documents in Case File** Study regulations Personal data Recommendation form form

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#### **References to Decision Models**

- Decision models can be referenced from
  - Process models
  - Case plan models
  - BPCMN models



Candidate

Eligible

Eligibility Rules

### **Decisions requiring Human Judgment**

- Some decisions require human judgment
  - Example: Communication and analytical skills
- Can be supported by ...
  - Checklists
  - Best practices
  - Lessons learned
- Modelled as documents



#### **Decisions requiring Human Judgment**



### Conclusion

- Modeling of Knoweldge Work includes
  - process logic and business Logic
  - on different degrees of structure

in an integrated environment





The modeling language was developed in adoxx.org

form

Personal data

form

#### Model types of the Knowledge Work Designer





■ For the latest material see:

## http://knut.hinkelmann.ch/lectures/nemo2017/





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